



# Butterfly and other Invertebrates Club Newsletter

Issue no: 3      Date: August 1996 ISSN: 1326-0006

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## **Editorial**

Welcome to the third edition of our newsletter.  
Subscriptions are coming due. Please check your mailing  
label and send in your subscription.

We are going to set up a network of people to help with a project of propagating and planting the Arrow Head Violets in areas suitable for them around Brisbane, in the hope of helping the Australian Fritillary Butterfly -- a very threatened species -- to build up its numbers. Interested in this project? Contact us! Daphne made some beautiful and innovative butterfly cards, suitable for sending to friends on special occasions. She has offered these for us to sell to help raise funds for our group. At our July meeting it was decided to have business and planning meetings separate from our informative speaker directed meetings.

*Georgina*

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## Insect Physiology or how a butterfly "works"

A talk by Associate Professor Myron Zalucki, Thurs 27th June, 1996

Insects belong to the Phylum Arthropoda, and share the following characteristics with all arthropods:

- bilateral symmetry
- exoskeleton - hard outer shell
- jointed appendages
- segmented bodies
- paired limbs
- ventral nerve chord
- open circulation - their blood bathes all their organs, they have a heart.

The Class Insecta is one of the most successful groups of arthropods, they have three pairs of legs, however, not all animals with 6 legs are insects. Some of the other classes also have 6 legs, eg. Collembola.

Most insects, like butterflies have an adult or reproductive stage, an egg stage, larva (with 4 to 5 instars) and pupal stage. For the other insects, the immature stages are similar to the adult.

Egg shells are remarkable. They are made up of chitin, sugars, and have special structures that enable the passage of air to the developing larva. Female butterflies store sperm and as the egg is laid it is fertilized.

All caterpillars have glands near their mouth parts for spinning silk. This forms an essential part of their survival strategies.

Eating is a challenge for all 1st instar larvae. In the case of the Wanderer larvae, eating a toxic plant which extrudes a sticky milky sap, the larvae spin silk pads to anchor themselves, and this gives them a way to pull themselves away from the milky sap.

The insect body can be divided into three distinct parts: the head, the thorax, and the abdomen. 'Hair' like structures or setae cover

various parts of the animal. They have various sensing functions such as touch, taste and the detection of various chemicals.

While caterpillars are considered to be "cold-blooded", they can increase their body temperature by orienting to the sun, and can regulate their temperature to some extent. Adult butterflies can adjust temperatures very effectively. The warmer it is the faster the animal will go through its lifecycle. This has important implication for their population dynamics.

The skin of caterpillars can't stretch, the animal has to moult in order to grow. Insect skin has a fascinating structure. A single layer of cells called the epidermis produces the endo and exocuticle layers. The exocuticle becomes very hard but it is flexible. An epicuticle lies above the exocuticle , and contains cuticulin, which does not stretch. When a caterpillar is ready to moult it starts wandering, builds a silk mat, anchors itself and changes colour. The cuticle breaks away from the epidermis, and a moulting gel is secreted into the gap. The epidermis lays down a new cuticulin layer in folds. This defines the maximum size of the next instar. Sheets of sugars and proteins are laid down next. The moulting gel is activated and digests the old endocuticle and exocuticle up to the old epicuticle layer. The cuticulin is indigestible. The larva then pulls itself out of the old skin and sucks in air to expand itself out to its new size. The outer layer of the new cuticle is then hardened and the colour darkens, after which the endocuticle continues to be laid down. The whole process is mediated by hormones in a set fashion. The epicuticle itself has a fascinating structure comprising cement, wax and other layers. The wax prevents moisture loss.

A chemical, ecdysone, which is similar to cholesterol triggers the moulting process. Insects get these chemicals from plants. The chemical is released into the body cavity. Caterpillars moult several times, until the final moult is to form a pupa. These moults are mediated by hormones, the concentration

determines they type of moult. As the animal grows the concentration of juvenile hormone goes down, and the animal moults to the adult stage.

With adult butterflies colour attracts attention because they are day-flying. Butterfly antenna are covered in sensory hairs, and the large compound eyes which are good for detecting movement. They have a coiled proboscis, ie. mouthparts which act as a straw, enabling adults to feed on nectar, which is basically sugars. They may also need a source of nitrogen and proteins. Some butterflies feed on pollen. The caterpillar stage lays down fat deposits and stores of nitrogen, which the adult uses to produce eggs.

The butterfly has claw-like structures at the ends of its legs. These are used by females for scratching. The feet also have sensory pegs which can detect specific chemicals.

The head of a butterfly is used mainly for sensing and feeding. The antenna on the head detect odours. The brain or central nervous system is in the head. The thorax is used mainly for locomotion (this is where the feet and wings are attached). The abdomen contains many major organs. Spiracles, openings for the breathing system, allow the delivery of oxygen to every cell via trachea. The spiracles open and close. The abdomen contains the reproductive structures, fat bodies, gut and "heart". The abdominal segments are separated by soft membranes and covered in hard cuticle. Cuticle also lines the gut wall.

Malpighian tubules, like kidneys, are used to remove nitrogen waste. These tubules are connected to the gut. A central nerve chord runs along the underside of the body. It has extra ganglia along parts of its length. Each sensory hair of the butterfly has a nerve cell attached which send signals to the brain. Via this means butterflies can detect chemicals down to very low levels.

Mating behaviour relies on many visual and chemical signals. Males in the Danaines have hair pencils, which are a structure resembling a feather duster. This is everted by males during courtship. Males have androconia, special scales, which

produce scents used in courtship. The male inserts its own hair pencils into the androconia. The odours are held on a fine dust of cuticle. To produce these odours adults extrude saliva onto particular plants in order to dissolve specific chemicals from that plant. In Danaid butterflies, pyrolisidine alkaloids are collected by both males and females.

The female abdomen has a mating pore, where copulation takes place. Sperm is transferred in a packet, in the form of a spermatophore, into the female's bursa copulatrix which breaks open the spermatophore. The sperm then move to a storage organ called the spermatheaca, and each egg is fertilized as it is laid. Material from the spermatophore is used in making eggs. Females can mate on a number of occasions in some species.

Females, having located the host plant by sight and odour, and having scratched it to taste it, then use the hairs on her ovipositor to gauge how close she is to the plant and to have a final taste of the plant before laying the egg.

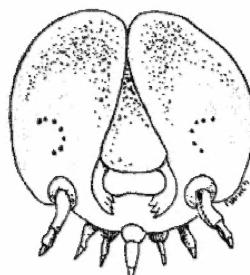
On the American continent Wanderer butterflies undertake massive migrations. During winter masses of butterflies aggregate to Mexico and to a lesser extent in California. In these overwintering sites they can tolerate the temperature down to -8°C to -15°C. If a butterfly drops to the forest floor, it can vibrate its wings which allows it to warm up and perhaps climb back up the tree. If it remains on the forest floor it dies. During this time in the aggregation the butterflies are sexually inactive. Once the weather warms the butterflies mate and begin flying north.

Wanderer butterflies take advantage of the toxins, cardiac glycosides, in their food source. They are taken in with the food into the gut and then moved to the outside of the exoskeleton. Wanderers maintain their toxicity during pupation and as an adult. The toxins cause birds that eat an adult to "throw up"

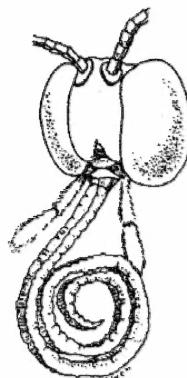


and are believed to be the basis of a "chemical" defence in this group of butterflies.

Caterpillar Head



Butterfly Head



## Club Projects

### Australian Fritillaries

Are you growing Arrowhead violets (*Viola betonicifolia*)?

This attractive ground cover plant is the host for the Australian Fritillary, a very elusive and endangered orangish, medium-sized butterfly, with lace-like blackish markings. It was recorded as occurring in Brisbane in the past, but there have been no official sightings for a number of years now. The problem for this butterfly, as with many others, is that its habitat on the coast, Melaleuca swamps, has given way to development. The violet also grows on the slopes of the coastal ranges and the Great Dividing Range.

However, Arrowhead violets make an attractive addition to any garden, and in the flowering season, August to September, can give you an attractive display of beautiful purple violets. These violets vary in colour, from pinkish to deep purple. Their shape and size depend on the original location of the plants. So even if the butterfly does not reappear quickly, you can have the satisfaction of seeing the flowers.

These plants prefer a moist location with dappled shade, but can grow in full sun. However, in full sun they need regular watering. They can grow in a variety of soil types. We have found that they seem to do the best in pots, into which they have often self-seeded. Due to the mechanics of pots, water

doesn't drain away as quickly as does water in soil.

Our July club meeting decided that those of us who were interested would start working on a campaign to save the Australian Fritillary. Our first step will be to commence propagating the host plant, and encouraging all our members to plant it. From there, once we have stock of the plants we may work on plantings in public places. We need to document any places where the violet still grows. A fact sheet is also planned.

Join the campaign and start telling your friends about this deserving creature.

### **Butterfly slides**

Do you have slides of any parts of the lifecycle of a Richmond Birdwing, Fourbar Swordtail or Macleay's Swallowtail, which you would be prepared to allow the club to use in the production of a poster? Please let Helen know, phone (07)3844 6677.



## Excursion Report

### Highlights of the excursion to Helen & Frank's place at West End on 25th May, 1996

While we are growing over 60 different host plant species, the following plants regularly attract butterflies to breed in our garden.

Plant Scientific Name	Plant Common Name	Butterfly Common Name
<i>Alphitonia excelsa</i>	Red Ash	Small Green-banded Blue Copper Jewel Fiery Jewel Indigo Flash
<i>Cassia brewsteri</i>		Lemon migrant
<i>Asclepias curassavica</i> †	Silkpod	Wanderer or Monarch Lesser Wanderer
<i>Themeda australis</i>	Kangaroo Grass	Evening Brown
<i>Archontophoenix cunninghamiana</i>	Bangalow palm	Orange Palm Dart
<i>Ficus opposita</i>	Ranya	Common Moonbeam
<i>Ficus coronata</i>	Sandpaper fig	Common Moonbeam
<i>Ehretia acuminata</i>	Koda	Hairy Line Blue
<i>Breynia oblongifolia</i>		Common Grass Yellow
<i>Trema cannabina</i>	Peach Leaf Poison Bush	Speckled Line Blue
<i>Plumbago zeylanica</i>	Plumbago	Zebra Blue
<i>Cassia mimosoides</i>		No Brand Grass Yellow
	Balsam, Busy Lizzy, Impatiens	Twitchy Tail Hawk moth
<i>Trifolium</i> sp.	Clover	Common Grass Blue
<i>Hygrophilla angustifolia</i>		Brown Soldier Tiny Grass Blue Blue Argus
<i>Citrus</i> spt	Lemon, orange, etc	Orchard Swallowtail
<i>Pipturus argenteus</i>	Native Mulberry	White Nymph
<i>Aristolochia tagala</i>	Pipeflower	Big Greasy
<i>Aristolochia</i> sp. (small leafed)	Pipeflower	Big Greasy
<i>Parsonia straminea</i> *	Monkey rope	Common Crow
<i>Cinnamomum</i> sp.†	Cinnamon	Blue Triangle
<i>Passiflora aurantia</i>	Native Passion flower	Glasswing
<i>Psoralea tenax</i>	Emu's Foot	Chequered Swallowtail
<i>Urtica incisa</i>	Stinging Nettle	Australian Admiral

We also grow the following, although we have not yet had the butterflies breeding on our plants:

Pseuderanthemum variable	Love flower	Australian Leafwing Blue-banded Eggfly Common Eggfly Danaid Eggfly Blue Argus
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and

Viola bentonicafolia	Native arrowhead violet	Australian Fritillary
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which is a highly endangered butterfly, which once occurred in Brisbane, however, habitat containing the host violet has been largely destroyed by development.

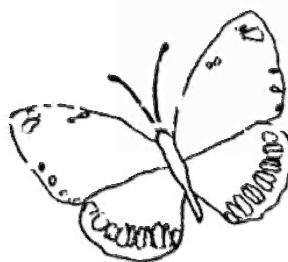
\* denotes good nectar source

† denotes non-native species

## Toohey Forest Excursion

After the visit to Helen & Frank's garden a group of us set out for Toohey Forest in the hope of finding winter aggregations of the Common Crow (*Euploea core*). We were led by Laurie Davis from the Toohey Forest Society. We examined a number of gullies where aggregations had been found in previous years, however, only small numbers were found in these locations. The main invertebrates we encountered were mosquitoes, not a highly favoured invertebrate by any means. However, apart from the mosquitoes we had a pleasant walk in the late afternoon, many thanks go to Laurie. We will try this again in future, perhaps next year won't have such a wet May. We did encounter a beautiful moth, *Gastrophora henricaria*, in the Geometridae family, whose larva eat Eucalypts and Angophora.

Helen Schwencke



## **Other Group's Activities**

### **Redland Shire Council**

Visit to Coochie Mudlo Island

**When:** Sunday, 20th October, 1996

**Details:** Meet 8.50am Victoria Point Jetty. B.Y.O. Lunch. Visit the Melaleuca Wetlands in the morning and mangroves in the afternoon. Contact as per program.

### **Queensland Naturalists' Club**

This club does a wide range of activities, and runs an extensive excursion programme. Some of these include:

September: 14 - 15th, North Stradbroke Island.

Leader: Deniss Reeves, ph. (07)3245 5518 (after 6pm). Deadline for registration: Fri, 30/8/96.

October: 19 - 27th, Cooloola.

Leader: John Moss, ph. (07)3245 2997 for more information.

Participation is limited to QNC members and their school age children.

### **Eprapah Creek Catchment Landcare Group**

We are joining this group for two invertebrate related activities this quarter, see our club programme.

They are also offering:

October, Thurs. 24th, 7.30pm

Paralysis Ticks presented by Dr. Bernard Stone

Venue: "Mungara", cnr Colburn Ave & Cleveland - Redland Bay Rd., Victoria Point.

For more information contact: Lyn Roberts, (07) 3206 4792.

Also the Redland Shire Council and Eprapah Creek group are holding a field day at Eprapah Creek on 9 November.

For more information contact Rosalie Eustace 3286 8459 or 0411 554 885

## **Butterfly and Other Invertebrates Club Programme**

**When:** Thursday, 22nd August, 1996

**Theme:** Biting Midges, presented by Dr. Eric Reye

**Where:** "Mungara", cnr Colburn Ave & Cleveland - Redland Bay Rd., Victoria Point

**Notes:** We are joining the Eprapah Creek Catchment Landcare Association's activity for this evening, for more info contact Secretary: Lyn Roberts, ph3206 4792.

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**When:** Saturday, 14th September, 1996, 2pm - 4pm

**Activity:** Collecting and identifying insects at Eprapah Creek Catchment

**Where:** Meet at "Mungara, cnr Colburn Ave & Cleveland- Redland Bay Rd. Victoria Point.

**Notes:** As above.

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**When:** Tuesday, 15th October, 1996, 7.30pm

**Planning meeting:** at Georgina's, 36 Turnmill St., McGregor, all welcome

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**When:** Sunday, 20th October, 1996

**Excursion:** Visit Coochie Mudlo Island, off Victoria Point

**Details:** Meet 8.50am Victoria Point Jetty. B.Y.O. Lunch.

**Notes:** This excursion is being led by Rosalie Eustace, Greening Officer? of the Redlands Shire Council R.S.V.P. Rosalie Eustace 3286 8459

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### **Membership Form**

Name: .....

Address: .....

Suburb / Town: ..... State: ..... Postcode: .....

Phone: ..... Fax: ..... Email: .....

If you are employed in a relevant occupation, or have a specific area of expertise, please specify the occupation and organisation: .....

.....  
If you are subscribing on behalf of a School, please specify which School: .....

.....  
If you have a specific area of interest, please specify: .....

.....  
I have enclosed a cheque / money order for (please specify membership / subscription type):  \$10.00 Individual / School  \$15.00 Family made payable to Butterfly and Other Invertebrates Club



## **Are You a Member?**

Please check your mailing label for the date your membership is due for renewal. If your membership is due, please renew as soon as possible. If your mailing label shows no date due, this is the last newsletter you will receive.

**Butterfly and other Invertebrates Club,**  
c/- PO Box 2041,  
Runcorn, Q 4113

## **Next Meeting:**

**Biting Midges, a talk by Dr Eric Reye, at Mungara, cnr  
Colburn Ave & Cleveland-Redland Bay Rd., Victoria Pt,  
Thursday, 22 August, 1996**